


Geiger counter

In this tutorial you will learn how to assemble a nuclear radiation detector


You can purchase the Geiger Counter Kit here

https://www.banggood.com/Assembled-DIY-Geiger-Counter-Kit-Module-Miller-Tube-GM-Tube-Nuclear-Radiation-Detector-p-1136883.html?rmmds=search&cur_warehouse=CN

 Difficulty **Hard**

 Duration **1 hour(s)**

 Categories **Electronics**

 Cost **30 EUR (€)**

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Introduction

A Geiger counter is an instrument used for detecting and measuring ionizing radiation. Also known as a Geiger-Mueller counter (or Geiger-Müller counter), it is widely used in applications such as radiation dosimetry, radiological protection, experimental physics, and the nuclear industry.

Geiger counters are used to detect radioactive emissions, most commonly beta particles and gamma rays. The counter consists of a tube filled with an inert gas that becomes conductive of electricity when it is impacted by a high-energy particle.

Materials

Tools

Step 1 - Soldering the geiger counter

This is a timelapse of the assembly process of the geiger counter

Step 2 - Using the geiger counter with an arduino

Connect the P3 Pin GND, 5V, VIN to arduino GND, 5V, Digital 2 respectively.

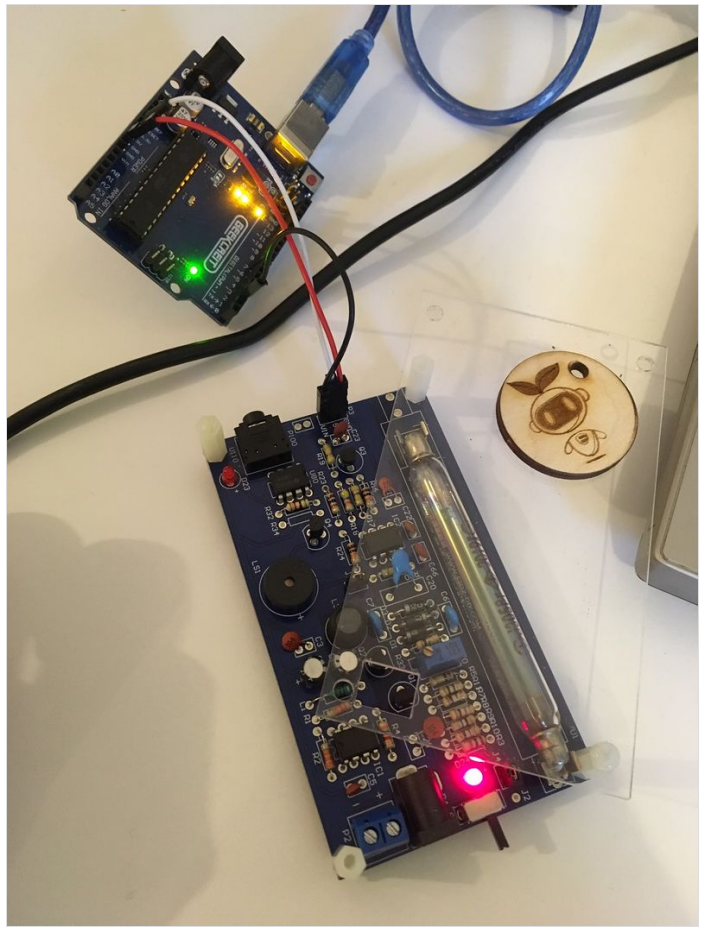
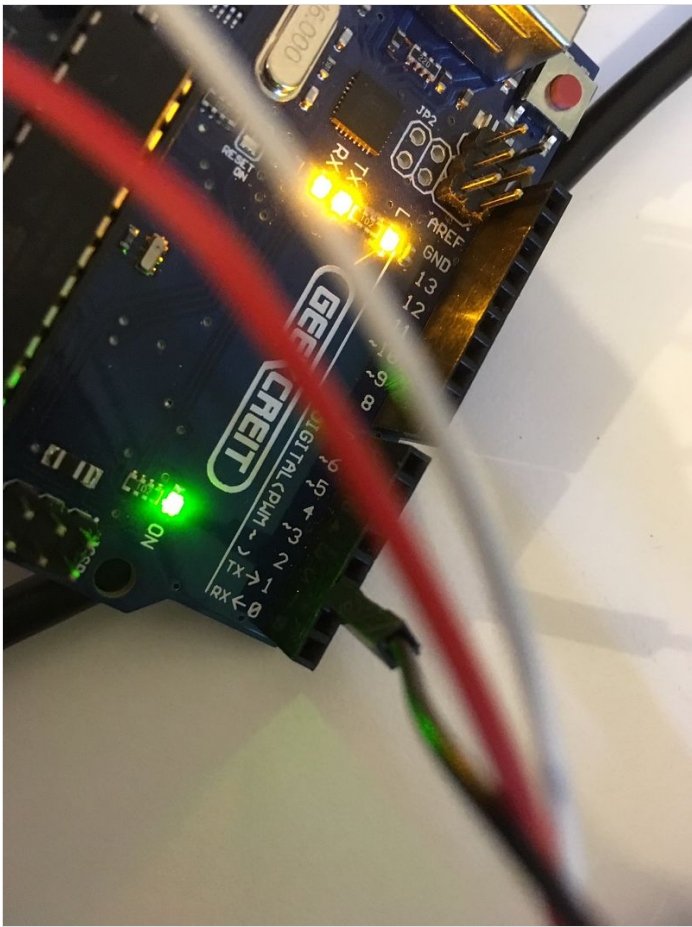
Then in the arduino software open the file: spi_rad_logger.ino which you could find here

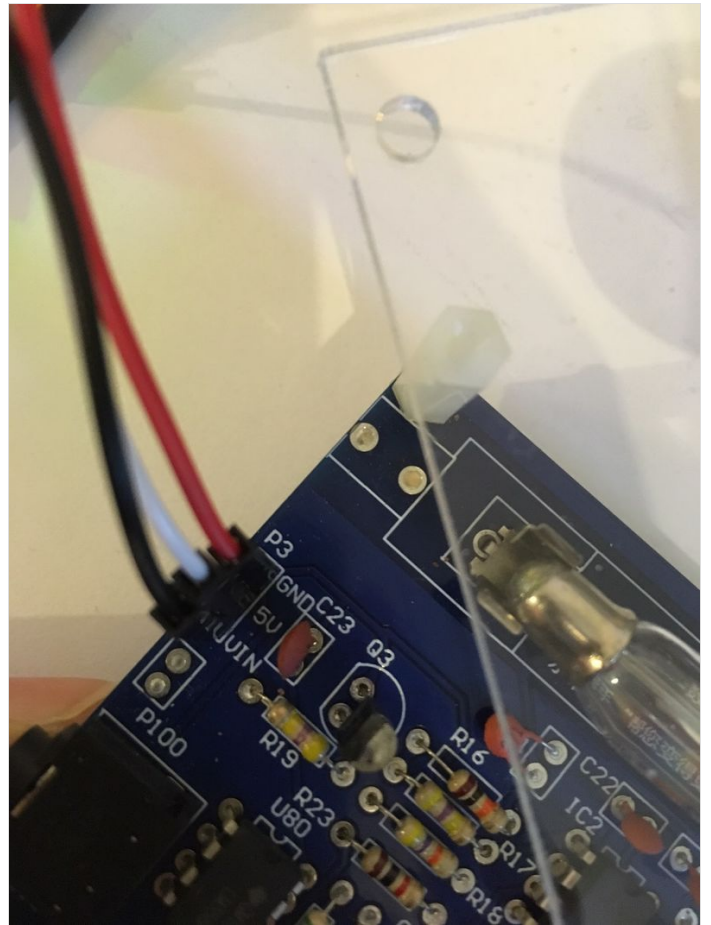
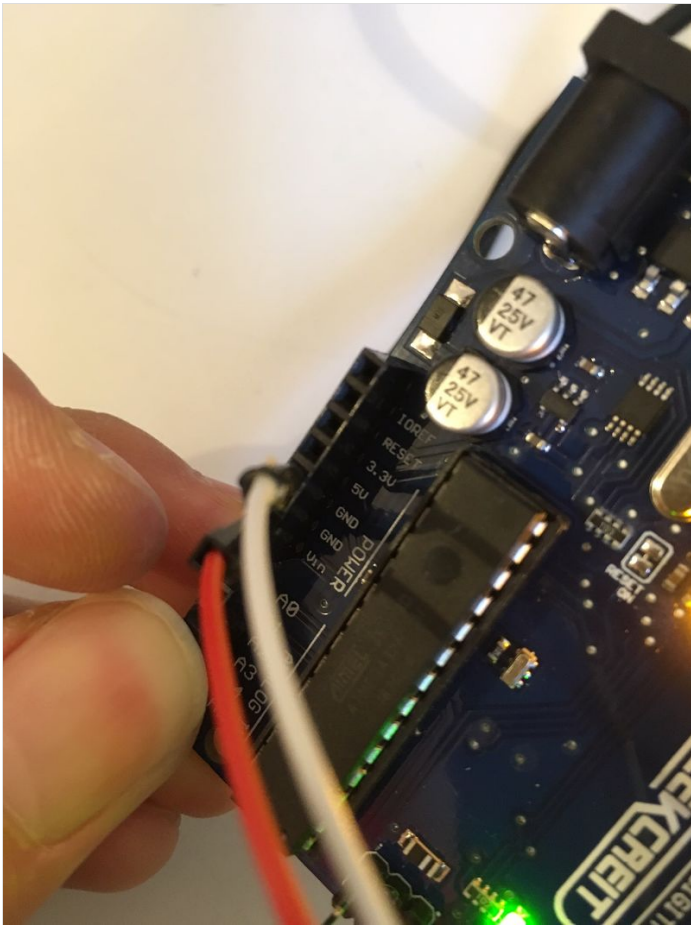
<https://drive.google.com/open?id=1BBhsOjpKFHZ5vheR6OtnmriIw6JLzbc>

Be sure to change the `Serial.print(cpm)` command to `Serial.println(cpm)` in the void loop for better readability.

Download the program and open the serial port window by clicking on the scope on the upper right corner.

Then we'll get the radiation value displayed in CPM, counter per minutes which could be converted to uSv/h with the index 151 (151CPM=1uSv/h for M4011 GM Tube).





```
void loop(){ //main cycle
  unsigned long currentMillis = millis();
  if(currentMillis - previousMillis > LOG_PERIOD){
    previousMillis = currentMillis;
    cpm = counts * multiplier;

    Serial.println(cpm);
    counts = 0;
  }
}
```

Notes and references

Description:

Name: Radiation Detector system

Geiger tube parameters:

Technical parameters diameter: $\Phi 10 \pm 0.5 \text{mm}$

Total length: $90 \pm 2 \text{mm}$

Starting voltage: $< 350 \text{V}$

Recommended operating voltage: 380V

Minimum plateau length: 80V

Maximum plateau slope: $10\%/80 \text{V}$

Extreme operating voltage: 550V

The maximum count rate: 25 times / min

Life: $> 1 \times 10^9$ pulse

Medium temperature: $-40 \sim 55 \text{ }^\circ\text{C}$

Size: $108 \times 63 \times 20 \text{mm}$

Infos:

https://www.banggood.com/Assembled-DIY-Geiger-Counter-Kit-Module-Miller-Tube-GM-Tube-Nuclear-Radiation-Detector-p-1136883.html?rmmms=search&cur_warehouse=CN

<https://drive.google.com/folderview?id=0B9itH-BnWE5sY2JGRkM4MWhSYkE&usp=sharing>

<https://drive.google.com/drive/folders/0B9itH-BnWE5sY2JGRkM4MWhSYkE>

Features:

1) 5V power supply, or 1.5V 3x battery; 1.2V 4x battery, current: 30mA - 12mA

2) for the detection of 20mR/h ~ 120mR/h of gamma rays and 100 ~ 1800 off variables / points / cm^2 of the soft beta ray.

3) sound and light alarm

4) interrupt the output interface, through this interface can be connected to the microcontroller and then displayed on the LCD.

5) Arduino compatible

6) supports most of the Geiger tube: M4011, STS-5, SBM20, J305, etc. (the 330~600V operating voltage of the Geiger tube can be supported).

7) support the computer (PC) data acquisition, Matlab analysis and processing

Detection of nuclear radiation work (copy the following link to the browser to watch):

[Http://v.youku.com/v_show/id_XNzI3MTU2NzQ0.html](http://v.youku.com/v_show/id_XNzI3MTU2NzQ0.html)

Customers using our Geiger counter to record the video:

[Http://v.youku.com/v_show/id_XOTE4ODIyNTIw.html](http://v.youku.com/v_show/id_XOTE4ODIyNTIw.html)

Compatible with Arduino:

(recommended UNO R3 Arduino, or any other arbitrary with 5V and external interrupt INT)

Internet can be downloaded: SPI example for Radiation Logger Arduino

Logger Radiation can be used as the host computer software to build radiation monitoring station.

Package included:

1 x Assembled Radiation Detector system

1 x GM Tube

1 x Power supply cable

1 x Battery Holder (without batteries)

3 x Jumper Wires

4 x Nuts

1 x Acrylic cover